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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/743,624	04/22/2004	Gino Georges Lavoie	71632	7402

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EXAMINER

OH, TAYLOR V

ART UNIT	PAPER NUMBER
1625	

DATE MAILED: 11/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/743,624

Applicant(s)

LAVOIE, GINO GEORGES

Examiner

Taylor Victor Oh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

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Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection.

The Status of Claims

Claims 1-21 are pending.

Claims 1-21 have been rejected.

DETAILED ACTION

1. Claims 1-21 are under consideration in this Office Action.

Priority

2. None.

Drawings

3. The drawing filed on 4/22/2004 is accepted by the Examiner.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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Claims 1-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1 , the phrases "substantially free of " and " incompletely oxidized reaction products comprising 4- carboxybenzaldehyde compounds " are recited. They are vague and indefinite because the expression of the term "comprising" would mean that there are other additional components besides the only compound and the phrase "substantially free " does not elaborate what is meant by the phrase "substantially free ".

Also, there is uncertainty as to the term "comprising" used in the expression of the definite compound. Furthermore, the term " comprising" is an open language without a limit in the claim; the expression do not exclude the presence of other ingredients than the one or ones recited. Exparte Muench , 79 USPQ 92 (PTO BD. APP. 1948) and Swain V. Crittendon , 332 F 2d 820 , 141 USPQ 811 (C.C.P.A 1964). Therefore, an appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-16, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parker et al (US 6,476,257) in view of Shigeyasu et al (US 4,160,108) .

Parker et al discloses a method of producing terephthalic acid in the following example :

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p-Xylene, acetic acid and catalyst were placed in 150 ml of titan pressure reactor. Total amount of reactants was 30.42 g and the ratio of p-xylene and acetic acid was 17:83. Each amount was 899 ppm for cobalt, 1170 ppm for manganese and 2990 ppm for bromine in cobalt/manganese/bromine complex catalyst based to the total weight of reactants. Cobalt bromide was used for sources of cobalt and bromine. Manganese acetate tetrahydrate was used as a source of manganese. 163 ppm of nickel was used based on the total weight of reactants and nickel acetate tetrahydrate was used as a source of nickel. The reaction mixture was stirred under nitrogen atmosphere and heated to 170° C. 50% of nitrogen gas and 33.3% of carbon dioxide gas were applied and 16.7% of oxygen gas was then applied instantaneously into the reaction mixture. The pressure was applied to be total gauge pressure of 12 and fresh oxygen was continually applied for consumed amount. The reaction mixture was reacted for 180 min and then cooled. The oxide product was collected and dried. The reaction condition, consumed amount of oxygen, and yield of each terephthalic acid and p-toluic acid were summarized in Table 1. When Example 1 was compared to Comparative Example 3 wherein carbon dioxide and nickel were not used, the reaction efficiency of Example 1 was improved 16.9% and the formation of the desired product terephthalic acid was remarkably increased. Further when Example 1 was compared to Comparative Example 1 wherein only carbon dioxide was used, the reaction efficiency was similar by using nickel but the selectivity toward the formation of terephthalic acid was

much higher than that of Comparative Example 1. When Example 1 was compared to Comparative Examples 1 and 2, in which either carbon dioxide or nickel was added, and Comparative Example 3, in which either carbon dioxide or nickel was not added, the increment of the yield of terephthalic acid in Example 1 is much higher than the sum of each increment of Comparative Examples 1 and 2, clearly exhibiting a synergistic effect.

(see col. 4 , example 1)

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It is prefer to use manganese/cobalt in the atomic weight ratio range of 0.1-5, preferably 0.5-3 in cobalt/manganese/bromine complex catalyst. It is further prefer to use bromine/(manganese+cobalt) in the atomic weight ratio range of 0.1-5, preferably 0.5-2. Cobalt is used 50-10,000 ppm relative to the total amount of reactants, preferably 100-1,000 ppm. Any bromine compound such as HBr, Br₂, tetra-bromoethane and benzyl bromide may be used as a source of bromine. As sources of manganese and cobalt, any compound being soluble in a used solvent may be possible (e.g. acetates, carbonates, acetate tetrahydrates and bromides). It is prefer to have the atomic weight ratio of nickel/manganese in the range of 0.01-1. If the weight ratio is higher which means more amount of nickel than preferred is used, the other catalyst compounds could not act as the catalyst.

(see col. 3 ,lines 116-33).

Aromatic carboxylic acids of the present invention are prepared by batch or continuous process. Preferred temperature is in the range of 100-255° C., more preferably 170-210° C. If the temperature is lower than 100° C., the reaction rate is too slow to be practical. On the other hand, if is higher than 255° C., it is not economical due to side reactions. Reaction pressure is used to keep alkylaromatic compounds, its intermediates, and solvent in partially liquid state and preferably 1-35 atm of gauge pressure, more preferably 8-30 atm.

(see col. 3 ,lines 50-60).

However, the instant invention differs from the prior art in that the claimed 4-CBA content in solids is 10,000 ppm or less.

Shigeyasu et al teaches a process of producing terephthalic acid by subjecting p-xylene to a liquid-phase oxidation in a lower aliphatic carboxylic acid solvent in the presence of a cobalt , manganese (see abstract page), a bromide of nickel (see col. 6 ,line 53). Also it is related to the process of producing a high purity terephthalic acid suitable for use as starting material for making a high quality polyester (see col. 1 ,lines

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6-12). In addition, table I reveals the impurity content of 4-carboxybenzaldehyde present in the terephthalic acid (see col. 10, table 1).

Parker et al expressly discloses the method of producing terephthalic acid by oxidizing p-xylene in the presence of acetic acid, and the catalyst containing cobalt, manganese, bromine, and nickel at the reaction temperature of 100-255 °C. Similarly, Shigeyasu et al does teach the process of producing the pure terephthalic acid by subjecting p-xylene to a liquid-phase oxidation in a lower aliphatic carboxylic acid solvent in the presence of a cobalt, manganese (see abstract page), a bromide of nickel (see col. 6, line 53) so as to be used as starting material for making a high quality polyester (see col. 1, lines 6-12) by means of removing the impurity content of 4-carboxybenzaldehyde present in the terephthalic acid (see col. 10, table 1). Both processes are commonly involved in producing terephthalic acid under similar reaction conditions (i.e. temperature and catalyst). Therefore, it would have been obvious to the skilled artisan in the art to be motivated to incorporate the teaching of the Shigeyasu et al with respect to adjusting the content of 4-CBA into the Partenheimer et al process in order to make the pure terephthalic acid starting material for making a high quality polyester (see col. 1, lines 6-12). This is because the skilled artisan in the art would expect such a combination to be successful and effective to control the purity of the final terephthalic acid applicable for manufacture of polyester as shown in the Shigeyasu et al.

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Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Partenheimer et al (US 4,786,753) in view of Shigeyasu et al (US 4,160,108).

Partenheimer et al discloses a method of producing terephthalic acid by oxidizing 70-80 % (see col. 2 ,line 43) of p-xylene in the presence of a catalyst composition comprising 2.01 mmol of Ni, 2.01 mmol of Mn, and 2.01 mmol of bromine (see col. 5 ,lines 15-38) at a pressure of 150 psig and at a temperature of 160⁰ C (see col. 2 ,lines 65-66). Furthermore, the resulting gases in the reactor have been sent to oxygen and CO₂ analyzers to measure the extent of reaction and degree of burning as shown in the table III (see col. 6 table III).

However, the instant invention differs from the prior art in that the claimed 4-CBA content in solids is 10,000 ppm or less; the claimed ratio of solvent burn is 0.8 moles CO_x per mole of terephthalic acid or less.

Shigeyasu et al teaches a process of producing terephthalic acid by subjecting p-xylene to a liquid-phase oxidation in a lower aliphatic carboxylic acid solvent in the presence of a cobalt , manganese (see abstract page), a bromide of nickel (see col. 6 ,line 53). Also it is related to the process of producing a high purity terephthalic acid suitable for use as starting material for making a high quality polyester (see col. 1 ,lines 6-12). In addition, table I reveals the impurity content of 4-carboxybenzaldehyde present in the terephthalic acid (see col. 10 , table 1).

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Concerning the claimed ratio of solvent burn, the prior art is silent about the ratio. However, Partenheimer et al does teach guidance that the resulting gases in the reactor can be sent to oxygen and CO₂ analyzers to measure the extent of reaction and degree of burning (see col. 5 ,lines 60-62) as shown in the table III (see col. 6 table III). Therefore, it would have been obvious to the skilled artisan in the art to obtain the claimed ratios by using the trial and error process as shown in the guidance(see col. 5 ,lines 60-62).

Partenheimer et al expressly teaches the method of producing terephthalic acid by oxidizing p-xylene in the presence of a catalyst composition comprising Ni, Mn, and bromine at a pressure of 150 psig and at a temperature of 160⁰ C. Similarly, Shigeyasu et al does teach the process of producing the pure terephthalic acid by subjecting p-xylene to a liquid-phase oxidation in a lower aliphatic carboxylic acid solvent in the presence of a cobalt , manganese (see abstract page), a bromide of nickel (see col. 6 ,line 53) so as to be used as starting material for making a high quality polyester (see col. 1 ,lines 6-12) by means of removing the impurity content of 4-carboxybenzaldehyde present in the terephthalic acid (see col. 10 , table 1). Both processes are commonly involved in producing terephthalic acid under similar reaction conditions (i.e. temperature and catalyst). Therefore, it would have been obvious to the skilled artisan in the art to be motivated to incorporate the teaching of the Shigeyasu et al with respect to adjusting the content of 4-CBA into the Partenheimer et al process in order to make the pure terephthalic acid starting material for making a high quality polyester (see col. 1 ,lines 6-12). This is because the skilled artisan in the art would

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expect such a combination to be successful and effective to control the purity of the final terephthalic acid applicable for manufacture of polyester as shown in the Shigeyasu et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Taylor Victor Oh whose telephone number is 571-272-0689. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas McKenzie can be reached on 571-272-0670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Taylor Victor Oh , MSD,LAC
Primary Examiner
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11/21/06